

CLAIMS

[1]

A laser-diode-pumped solid-state laser oscillator,  
characterized by comprising:  
5       a solid-state pumping medium;  
          a plurality of laser diodes arranged around said  
solid-state pumping medium and adapted to irradiate pumping  
light to said solid-state pumping medium;  
          detection means adapted to detect a failure of said laser  
10      diode; and  
          control means adapted to determine a position of said laser  
diode, the failure of which is detected by said detection means,  
and to control supply currents to other normal laser diodes,  
according to the position of said laser diode whose failure  
15      occurs.

[2]

The laser-diode-pumped solid-state laser oscillator  
according to claim 1, characterized in that:

20      said control means is adapted to stop supply of electric  
current to and turn off a part or all of normal laser diodes  
positioned on a same plane as the position of said laser diode  
whose failure occurs and perpendicular to a central axis of  
said solid-state pumping medium.

[3]

25      The laser-diode-pumped solid-state laser oscillator

according to claim 2, characterized in that:

said control means is adapted to stop supply of electric current to and turn off a normal laser diode provided at a position facing the position of the laser diode whose failure occurs  
5 in a case where a direction number of said laser diodes is even.

[4]

The laser-diode-pumped solid-state laser oscillator according to claim 2, characterized in that:

said control means is adapted to stop supply of electric current to and turn off all of the normal laser diodes positioned on the same plane as the position of said laser diode whose failure is caused and perpendicular to the central axis of said solid-state pumping medium in a case where a direction number of said laser diodes is odd.

15 [5]

The laser-diode-pumped solid-state laser oscillator according to one of claims 1 to 4, characterized in that:

said detection means is provided between electrodes of said laser diode and is adapted to detect a failure of said  
20 laser diode according to a voltage between said electrodes of said laser diode.

[6]

The laser-diode-pumped solid-state laser oscillator according to one of claims 2 to 5, characterized in that:

25 said control means is adapted to short-circuit between

electrodes of said laser diode and to bypass electric current flowing through said laser diode by controlling a bypass means provided between said electrodes of said laser diode.

[7]

5       The laser-diode-pumped solid-state laser oscillator according to one of claims 1 to 6, characterized by including: adjusting means adapted to detect power of an outputted laser beam and to adjust an amount of electric power supplied to said laser diode so as to obtain desired laser beam power.

10      [8]

The laser-diode-pumped solid-state laser oscillator according to one of claims 1 to 7, characterized in that: a plurality of cavities, each of which is a combination of said solid-state pumping medium and said laser diode, are arranged on a same optical axis of a laser beam to thereby obtain 15 a laser output.

[9]

A method of controlling laser diodes of a laser-diode-pumped solid-state laser oscillator adapted to 20 pump a solid-state pumping medium by pumping light outputted from said laser diodes to obtain a laser output, characterized by comprising the steps of:

detecting a failure of said laser diode;  
determining a position of said laser diode the failure  
25 of which occurs;

selecting a laser diode, which is to be turned off,  
according to the determined position;  
turning off said selected laser diode; and  
adjusting a laser output, which is changed by turning off  
5 said laser diode, to a desired laser output.

[10]

The method of controlling laser diodes according to claim  
9, characterized in that:

10 said step of selecting said laser diode is adapted to select  
a part or all of normal laser diodes positioned on a same plane  
as the position of said laser diode whose failure occurs and  
perpendicular to a central axis of said solid-state pumping  
medium.

[11]

15 The method of controlling laser diodes according to claim  
9, characterized in that:

16 said step of selecting said laser diode is adapted to select  
a normal laser diode provided at a position facing the position  
of said laser diode whose failure occurs in a case where a  
20 direction number of said laser diodes is even.

[12]

The method of controlling laser diodes according to claim  
9, characterized in that:

25 said step of selecting said laser diode is adapted to stop  
supply of electric current to and turn off all of normal laser

diodes positioned on the same plane as the position of said laser diode whose failure is caused and perpendicular to the central axis of said solid-state pumping medium in a case where a direction number of said laser diodes is odd.